Former Distinguished Professor Returns to Present the Terawatt Challenge

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Former NPS Distinguished Professor of Physics Dr. Nancy Haegel presented the latest Defense Energy Seminar on “Terawatt-Scale Photovoltaics: Trajectories and Challenges” in the Mechanical Engineering Auditorium, July 28. After 11 years at NPS, Haegel joined the National Renewable Energy Lab in 2014 as the director of its Materials Science Center.

Haegel’s discussion focused on the use of photovoltaics for energy generation around the world, and the need for significantly more in order to make a dent in global energy demand.

“We have about 300 gigawatts of photovoltaics installed around the world, and in order to have a significant fraction of the world’s energy, we need to move that up another order of magnitude ... into the terawatt scale,” Haegel explained.

Today’s energy systems and grids are diverse, sometimes old, and very well-established, she noted, and that makes applying new technologies into these deeply-rooted systems incredibly challenging. On a global scale, renewable energies represent a small percentage of use, but have the largest rate of increase in implementation.

To achieve the terawatt threshold of usage, Haegel recommended these key areas of development.

“The business and finance models have to develop because the sun is a different kind of source, no one owns it or controls it,” said Haegel. “Only 20 percent of our energy consumption is electricity. To impact the system on a large scale, we need to start thinking about how to convert solar energy into other things.” Haegel offered the transition of automobiles from fossil fuels to electrical power as an example.

“How do we store it? How do we modernize the grid so that we can use renewable energies? How do we scale the manufacturing so that it can be at a scale to make a significant impact?” she posed.

“The DOD has an operational energy interest that is very specific, and very critical, and it can be informed from many sources. Hopefully this inspires ideas, which could very well lead to a student’s thesis project,” she continued, concluding her presentation with several examples of photovoltaic-related research topics ready for students to start on.

“Some of which already have DoD funding,” she added. “And we would love to have NPS students at NREL if we can figure out the time and logistics.”

As a member of NPS’ Department of Physics, Haegel recalled attending the Energy Academic Group’s Defense Energy Seminars, describing them as a great opportunity for students looking for thesis ideas.

“I use to come to the energy seminars when I taught here, they have always been able to get outstanding speakers ... I think [the program] is a real strength of NPS,” said Haegel.